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## REMARKS

Claims 1 and 3-27 remain herein.

Claims 1, 3-6, 8-10, 12-14, 16, 18, 20 and 22-27 were rejected under 35 U.S.C. §112, second paragraph.

The Office Action notes that claims 4, 6 and 24 depended from claim 2, which has been cancelled. In response, claims 4, 6 and 24 are amended as set forth above to depend from claim 1.

The Office Action also includes a statement that the expression "total cross-sectional area" is unclear. In response, claims 1, 8, 12, 13, 22, 25, 26 and 27 have been amended to confirm that the expression "total cross-sectional area" refers to the cross-sectional area of each tab.

Reconsideration and withdrawal of this rejection are requested.

Claims 1 and 3-27 were rejected under 35 U.S.C. §103(a) over Japanese 10-172534 (JP '534) in view of U.S. Patent No. 6,099,986 (Gauthier '986).

With regard to the features recited in claim 1 that each of the tabs has a cross-sectional area not less than a constant area (in accordance with the material of the tab) so that the tabs do not fuse when at least 100A current flows through the battery, the Office Action asserts that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In this context, the Office Action further contains a statement that apparatus claims cover what a device *is* not what a device *does*.

It is respectfully noted that the recitation in claim 1 that the tabs each have a large enough total cross-sectional area that they do not fuse when a current of at least 100 amps flows through the battery, taking into account the material out of which the tabs are made, is a structural feature. That is, recitation that an element is capable of withstanding a specific quantifiable treatment is a structural recitation and can be used to distinguish a claim directed to an apparatus from a prior art apparatus which fails to include structure which is capable of satisfying the recited feature. Moreover, it has consistently and repeatedly been held that a claimed structural element in a claim directed to an apparatus can be recited functionally.

The Office Action further includes a statement that "based purely upon the laws of physics, ... any conductor 'may not fuse when at least 100A' flows through it, given that the time of such flow is sufficiently brief. Current has no direct relationship to with whether or

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not a conductor fuses."

The Applicants respectfully and strongly disagree with the Examiner, because current has a direct relationship with whether or not a conductor fuses. The precise function of a fuse is to immediately break electrical connection when current exceeds a particular value. This is the reason why fuses are rated according to a minimum amperage which, if exceeded, results in the circuit being broken immediately.

JP '534 merely discloses that the width of the negative electrode plate should be less than half of the width of the positive electrode plate to provide selective fusing of the negative electrode plate, as is clear from the English language abstract supplied with the Information Disclosure Statement filed on September 19, 2001. JP '534 contains no disclosure which would motivate one of skill in the art to use either negative or positive electrode tabs having respective cross-sectional areas selected, with reference to the material out of which the tabs are formed, so that the tabs do not fuse when at least 100A current flows through the battery.

The Office Action further contains a statement that JP '534 discloses aluminum and copper tabs having thickness of 100 microns and 70 microns. The Office Action states that this disclosure alone suggests, but does not prove, that the cross-sectional areas are within the claimed range. From these comments in the Office Action, it is confirmed that JP '534 does not disclose cross-sectional areas within the scope of the claimed invention, and the U.S. PTO improperly attempts to add to the disclosure in JP '534. There is no basis in the record or in JP '534 for the statement in the Office Action that the disclosure of thicknesses of 100 microns and 70 microns "suggests" that the cross-sectional areas would be within the claimed range.

The Office Action further contains a statement that "it would have been obvious to one of ordinary skill in the art to have optimized the cross-sectional areas of the tabs to suit a particular situation according to the intended use". It is clearly improper for the U.S. PTO to assert that it would have been obvious to optimize a feature in a prior art reference, where the reference does not give any suggestion that such a feature should be optimized and does not suggest that the feature is a result-effective variable. It is furthermore improper for the U.S. PTO to merely assert that important features of a claimed invention "could be optimized to suit a particular situation" where such a situation and optimization of a variable are nowhere

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disclosed in the prior art.

Regarding claim 7, the office Action contains an assertion that JP '534 discloses that the tabs function as current fuses to become nonconductive in the event that a condition arises during discharge of the battery in which sufficient current to damage one or more components of the battery is provided. The U.S. PTO appears to be referring to disclosure in the abstract of JP '534 that generation of internal short circuit is prevented by setting fusion limiting current based on the material and the total cross-sectional area of a lead to be connected to the positive or negative electrode to a value less than the outer short circuit current, and setting the fusion limiting current of a lead connected to the other electrode to a value more than the outer short circuit current. However, such disclosure in JP '534 does not mean that the tabs become nonconductive when current passing through them becomes sufficient to damage one or more components of the battery. Again, the U.S. PTO asserts that one of skill in the art would have optimized the size of the tabs "to suit a particular situation", without any disclosure in the prior art of such optimization and without any description of any such "particular situation".

In addition, it is respectfully noted that where size or relative dimensions in an invention provide functions which are neither disclosed or suggested in the prior art, such features clearly are sufficient to distinguish a claimed device from the prior art, notwithstanding the citations listed in the Office Action. The Office Action makes further statements regarding "maximize efficiency of the battery" and "achieving a product that performs reproducibly" and "to have optimized the capacity of the battery to suit a particular intended use" without providing any basis in the references for any desire to provide such properties or to describe any such "particular intended use".

Gauthier '986 is cited for alleged disclosure of an organic electrolyte in a lithium battery. Accordingly, Gauthier '986 fails to overcome the shortcomings of JP '534 as that reference is attempted to be applied against claims 1 and 3-27.

Accordingly, the subject matter of each of claims 1 and 3-27 would not have been obvious in view of JP '534, Gauthier '986 or any combination thereof. Therefore, reconsideration and withdrawal of this rejection are requested.

Claims 1 and 3-27 were rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,071,638 (Fradin '638) in view of Gauthier '986.

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With regard to the features recited in claim 1 that each of the tabs has a cross-sectional area so that the tabs do not fuse when at least 100A current flows through the battery, the Office Action again asserts that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function, and again states that apparatus claims cover what a device *is* not what a device *does*.

As noted above, the recitation in claim 1 that the tabs each have a large enough total cross-sectional area that they do not fuse when a current of at least 100 amps flows through the battery is a structural feature. Recitation that a structure is capable of withstanding a specific quantifiable treatment is a structural recitation and can be used to distinguish a claim directed to an apparatus from a prior art apparatus which fails to include structure which is capable of satisfying the recited feature. Moreover, a claimed structural element in a claim directed to an apparatus can be recited functionally.

The Office Action repeats the statement that "based purely upon the laws of physics, ... any conductor 'may not fuse when at least 100A' flows through it, given that the time of such flow is sufficiently brief. Current has no direct relationship to with whether or not a conductor fuses."

As noted above, current has a direct relationship with whether or not a conductor fuses, and the precise function of a fuse is to immediately break electrical connection when current reaches a particular value.

Fradin '638 contains no disclosure which would motivate one of skill in the art to use either negative or positive electrode tabs having respective cross-sectional areas selected, with reference to the material out of which the tabs are formed, so that the tabs do not fuse when at least 100A current flows through the battery.

The Office Action further contains a statement that Fradin '638 discloses aluminum, nickel and copper tabs having thickness in the range of from 50 microns to 200 microns. The Office Action states that this disclosure alone suggests, but does not prove, that the cross-section areas are within the claimed range. From these comments in the Office Action, it is confirmed that Fradin '638 does not disclose cross-sectional areas within the scope of the claimed invention, and the U.S. PTO improperly attempts to add to the disclosure in Fradin '638. There is no basis in the record or in Fradin '638 for the statement in the Office Action that the disclosure of thicknesses of 50 to 200 microns "suggests" that the cross-sectional

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areas would be within the claimed range.

The Office Action further contains a statement that "it would have been obvious to one of ordinary skill in the art to have optimized the size of the tabs to suit a particular situation". As noted above, it is clearly improper for the U.S. PTO to assert that it would have been obvious to optimize a feature in a prior art reference, where the reference does not give any suggestion that such a feature should be optimized and does not suggest that the feature is a result-effective variable. It is furthermore improper for the U.S. PTO to merely assert that important features of a claimed invention "could be optimized to suit a particular situation" where such a situation and optimization of a variable are nowhere disclosed in the prior art.

The Office Action further contains a statement that "differences in size or relative dimensions is not sufficient to distinguish a claimed device from the prior." However, as noted above, where size or relative dimensions in an invention provide functions which are neither disclosed or suggested in the prior art, such features clearly are sufficient to distinguish a claimed device from the prior art, notwithstanding the citations listed in the Office Action.

Regarding claim 7, again the Office Action again asserts that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function, and again states that apparatus claims cover what a device *is* not what a device *does*.

The recitation in claim 7 that "the tabs function as current fuses to become nonconductive in the event that a condition arises during discharge of the battery in which sufficient current to damage one or more components of the battery is provided" is a structural feature, and distinguishes claim 7 from the applied prior art apparatuses which fail to include structure which is capable of satisfying the recited feature. As noted above, it has consistently and repeatedly been held that a claimed structural element in a claim directed to an apparatus can be recited functionally.

Again, the U.S. PTO asserts that one of skill in the art would have optimized the size of the tabs "to suit a particular situation", without any disclosure in the prior art of such optimization and without any description of any such "particular situation".

As noted above, the statements in the Office Action that "differences in size or relative dimensions is not sufficient to distinguish a claimed device from the prior" is simply

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not correct. Where size or relative dimensions in an invention provide functions which are neither disclosed or suggested in the prior art, such features clearly are sufficient to distinguish a claimed device from the prior art.

The Office Action makes further statements regarding "maximize efficiency of the battery" and "achieve a product that performs reproducibly" without providing any basis in the references for any desire to provide such properties or to describe any such "particular intended use".

Gauthier '986 is cited for alleged disclosure of an organic electrolyte in a lithium battery. Accordingly, Gauthier '986 fails to overcome the shortcomings of Fradin '638 as that reference is attempted to be applied against claims 1 and 3-27.

Accordingly, subject matter of each of claims 1 and 3-27 would not have been obvious in view of Fradin '638, Gauthier '986 or any combination thereof. Therefore, reconsideration and withdrawal of this rejection are requested.

In view of the above, claims 1 and 3-27 are in condition for allowance.

If the Examiner believes that contact with Applicant's attorney would be advantageous toward the disposition of this case, the Examiner is herein requested to call Applicant's attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,



Kevin C. Brown  
Reg. No. 32,402

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Date

KCB/jms

BURR & BROWN  
P.O. Box 7068  
Syracuse, NY 13261

Customer No.: 025191  
Telephone: (315) 233-8300  
Facsimile: (315) 233-8320

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

1. (Thrice Amended) A lithium secondary battery, comprising:  
an internal electrode body including a positive electrode, a negative electrode, and a separator, the positive electrode and the negative electrode being wound or laminated with the separator so that the positive electrode and the negative electrode are prevented by the separator from coming into direct contact with each other;  
an organic electrolyte; and  
at least a plurality of tabs connected to each of the positive and negative electrodes for current collecting, each of the tabs having a total cross-sectional area not less than a constant area in accordance with the quality of the material to be used for the tabs so that the tabs connected to each of the positive and negative electrodes ~~may do not~~ fuse when at least 100 A current flows through the lithium secondary battery, each of said tabs being selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.009 \text{ cm}^2$ , copper tabs each having a total cross-sectional area of not less than  $0.005 \text{ cm}^2$  and nickel tabs each having a total cross-sectional area of not less than  $0.004 \text{ cm}^2$ .
4. (Twice Amended) The lithium secondary battery according to claim 21, wherein a thickness of a tab is not more than twice a thickness of an electrode active material layer in an electrode to which the tabs are welded.
6. (Amended) The lithium secondary battery according to claim 21, wherein a sum of resistance value of the tabs per a unit battery is not more than  $1 \text{ m}\Omega$ .
8. (Twice Amended) The lithium secondary battery according to claim 7, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not more than  $0.36/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$ , of a unit battery, copper tabs each having a cross-sectional area of not more than  $0.18/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not more than  $0.14/R \text{ cm}^2$ .

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

12. (Twice Amended) The lithium secondary battery according to claim 1, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.36/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$ , of a unit battery, copper tabs each having a cross-sectional area of not less than  $0.005 \text{ cm}^2$  and not more than  $0.18/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not less than  $0.004 \text{ cm}^2$  and not more than  $0.14/R \text{ cm}^2$ .

13. (Twice Amended) The lithium secondary battery according to claim 7, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.36/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$ , of a unit battery, copper tabs each having a cross-sectional area of not less than  $0.005 \text{ cm}^2$  and not more than  $0.18/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not less than  $0.004 \text{ cm}^2$  and not more than  $0.14/R \text{ cm}^2$ .

22. (Amended) The lithium secondary battery according to claim 1, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.014 \text{ cm}^2$ , copper tabs each having a cross-sectional area of not less than  $0.008 \text{ cm}^2$  and nickel tabs each having a total cross-sectional area of not less than  $0.008 \text{ cm}^2$ .

24. (Amended) The lithium secondary battery according to claim 21, wherein a thickness of a tab is not more than a thickness of an electrode active material layer in an electrode to which the tabs are welded.

25. (Amended) The lithium secondary battery according to claim 7, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not more than  $0.18/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$ , of a unit battery, copper tabs each having a cross-sectional area of not more than  $0.09/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not more than  $0.07/R \text{ cm}^2$ .



**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

26. (Amended) The lithium secondary battery according to claim 1, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.014 \text{ cm}^2$  and not more than  $0.18/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$ , of a unit battery, copper tabs each having a cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.09/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.07/R \text{ cm}^2$ .

27. (Amended) The lithium secondary battery according to claim 7, wherein said tabs are selected from among aluminum tabs each having a total cross-sectional area of not less than  $0.014 \text{ cm}^2$  and not more than  $0.18/R \text{ (cm}^2\text{)}$ , R being internal resistance, in  $\text{m}\Omega$  of a unit battery, copper tabs each having a cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.09/R \text{ cm}^2$ , and nickel tabs each having a total cross-sectional area of not less than  $0.008 \text{ cm}^2$  and not more than  $0.07/R \text{ cm}^2$ .